5.5 AIR QUALITY

5.5.1 Background

This air quality section assesses existing air quality conditions within the Gary/Chicago International Airport study area as a baseline for evaluating effects resulting from construction and operation of the proposed project. It provides the findings of ambient air quality, in compliance with the regulations and standards as promulgated by the Clean Air Act and Amendments (CAAA), the Indiana State Implementation Plan (SIP), as well as the requirements of Federal Conformity Rules for the CAAA.

5.5.2 Methodology

An air quality emission analysis was performed to determine the total emissions burden of various air pollutants released from aircraft, airport ground support equipment, rail activities, and nearby roadways. Roadway emissions analysis is consistent with the scenario described in the traffic section. The potential for mobile-source impacts is directly related to the number of vehicle trips within the project vicinity.

The construction emissions which resulting from construction equipment and vehicles engine exhausts, fugitive dust, as well as from excavation, demolition, and backfill activities, etc.; are also evaluated based on U.S. Environmental Protection Agency (U.S. EPA) procedures. The emission burdens are compared to the General Conformity Thresholds for various air pollutants.

Because the Proposed Action is to occur within the Indiana Lake Michigan Coastal Program (LMCP) area, the applicable summary matrix of laws and guidance documents for this environmental category has been reviewed to confirm that all state and local regulations have been considered in this EIS. The matrix on Air Quality issues can be found in **Appendix C** for reference. Matrix 5-9 Cross-reference of Air Quality Laws and Guidance Documents has been reviewed by the consulting team to confirm that all the identified items have been considered in the evaluation of the air quality impacts as described in this section.

5.5.2.1 Air Quality Regulations

5.5.2.1.1 National and State Ambient Air Quality Standards

The U.S. EPA defines ambient air in *40 CFR, Part 50*, as that portion of the atmosphere, external to buildings, to which the general public has access, in compliance with the 1970 Clean Air Act (CAA) and the 1990 Clean Air Act Amendments (CAAA). The U.S. EPA has enacted National Ambient Air Quality Standards (NAAQS) for the protection of public health and welfare, allowing for an adequate margin of safety for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particulates with a diameter less than or equal to a nominal 10 micrometers (PM10), ozone (O_3), nitrogen dioxide (NO_2) and lead (Pb). These six major pollutants, deemed criteria pollutants because threshold criteria can be established for determining adverse effects on human health, are described below.

Carbon monoxide is a colorless and odorless gas that results from the incomplete combustion of gasoline and other fossil fuels. In most cities, approximately 80 percent of CO emissions are from motor vehicles. Because CO disperses quickly the concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections and along heavily congested roadways.

Ozone, also a colorless gas, is a major constituent of photochemical smog at the earth's surface. The precursors in the formation of ozone are volatile organic compounds (VOCs) and nitrogen oxides (NOx). In the presence of sunlight, ozone is formed through a series of chemical reactions that take place in the atmosphere. Because the reactions occur as the pollutants are diffusing downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. Therefore, the effects of NOx and VOC emissions from mobile sources are usually examined on a regional basis.

Inhalable particulates (PM10) are emitted from various sources: industrial facilities, power plants, construction activity and diesel-powered vehicles. These particulates are less than 10 micrometers (μm) in diameter and, therefore, inhalable.

Sulfur dioxide (SO2) emissions are primarily associated with the combustion of sulfur-containing fuels, oil and coal.

Lead emissions are primarily associated with motor vehicles and industrial sources that use gasoline containing lead additives. All mobile source engines produced in the United States after 1980 are designed to use unleaded fuel, and the ambient air concentrations have declined significantly. Therefore, the analyses of lead emissions are not required.

There are two types of standards: primary and secondary. Primary standards are designed to protect sensitive segments of the public from adverse health effects that may result from exposure to criteria pollutants. Secondary standards are designed to protect the environment from any known or anticipated adverse effects of a pollutant, including the effects on the natural environment (soil, water, vegetation) and the manmade environment (physical structures). Areas that do not meet the NAAQS are called non-attainment areas; areas that meet both sets of criteria are known as attainment areas.

In 1997, the U.S. EPA also has established revised NAAQS for ozone and fine particulates. The current one-hour standard for ozone was to be supplanted by an eight-hour standard. The standard for PM10 was to be remain essentially unchanged, and a new standard for particulate matter less than or equal to 2.5 microns (PM2.5) was established. Although the U.S. EPA finalized these new standards in July 1997, a 1999 Federal court ruling blocked their implementation. The U.S. EPA has asked the Supreme Court to reconsider that decision.

The State of Indiana has adopted the NAAQS as the state ambient air quality standards that specify maximum permissible short-term and long-term concentrations of various criteria pollutants. National and Indiana standards for air quality are presented in **Exhibit 5.5-1**.

EXHIBIT 5.5-1
GARY/CHICAGO INTERNATIONAL AIRPORT
National and Indiana State Ambient Air Quality Standards

Pollutant	Primary	Secondary
Carbon Monoxide (CO)		
1-hour Average	35 ppm	35 ppm
8-hour Average	9 ppm	9 ppm
Sulfur Dioxide (SO_2)		
3-hour Average	--	1300 $\mu g/m^3$
24-hour Average	365 $\mu g/m^3$	--
Annual Arithmetic Mean	80 $\mu g/m^3$	--
Particulates (PM_{10})		
24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$
Annual Geometric Mean	50 $\mu g/m^3$	50 $\mu g/m^3$
Particulates ($PM_{2.5}$)*		
24-hour	65 $\mu g/m^3$	65 $\mu g/m^3$
Annual Geometric Mean	15 $\mu g/m^3$	15 $\mu g/m^3$
Ozone (O_3)		
1-hour Average	0.12 ppm	0.12 ppm
8-hour Average*	0.08 ppm	0.08 ppm
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	100 $\mu g/m^3$	100 $\mu g/m^3$
Lead (Pb)		
Quarterly Average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$

Notes:
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year.
* For information purposes only. A 1999 Federal court ruling blocked implementation of these standards, which U.S. EPA proposed in 1997. U.S. EPA has asked the U.S.Supreme Court to reconsider the decision.
Source: Code of Federal Regulations Title 40, Part 50, July 1991, Ambient Air Quality Standards.

5.5.2.1.2 Compliance Status of the Study Area

Gary/Chicago International Airport is located in Lake County, Indiana, within the U.S. EPA's Chicago-Gary-Lake County, Illinois-Indiana Interstate Air Quality Control Region. Lake County is currently classified by the U.S. EPA as non-attainment (severe-17) for the criteria pollutant O_3, non-attainment (primary) for SO_2, non-attainment (moderate) for PM10, and maintenance (The maintenance area is an area previously designated as nonattainment, but has been improved and re-classified by U.S. EPA as attainment status with a maintenance plan for a defined length) for CO. This area is designated as in attainment of the NAAQS for NO_2 and lead. The Conformity Rules are applied to both nonattainment and maintenance areas.

5.5.2.1.3 State Implementation Plan (SIP)

The CAAA requires each state to demonstrate the manner in which it will attain the NAAQS in nonattainment areas in a state implementation plan (SIP). To achieve and maintain the NAAQS in the future, Indiana has proposed a State Implementation Plan (SIP) to control and reduce potential CO, SO_2, PM10 and ozone precursors (VOC and NO_2) emissions. An important element of Indiana's SIP is an ongoing effort to identify and mitigate hot spot locations that have the potential to exceed the standards. The State of Indiana committed itself in the SIP to various area-wide and site-specific measures to reduce air pollutants levels and eliminate hot spots to ensure that the NAAQS will be met by the mandated schedules. Therefore, relevant SIP requirements were addressed in the air quality analysis.

As regulated in 326 IAC 2-6, the State of Indiana also requires any source located in Clark, Elkhart, Floyd, Lake, Marion, Porter, Saint, Joseph and Vanderburgh Counties that has the potential to emit 10 tons or more per year of VOC or NOx to report annual emissions to the IDEM for monitoring and control purposes.

5.5.2.1.4 Federal Conformity Rules

The 1990 Amendments to the Clean Air Act require Federal actions (including review and approval activities) to show conformance with a State Implementation Plan (SIP) in areas that have not attained the NAAQS. Conformity to a SIP means conformity to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. The guidelines for determining conformity are found in 40 CFR, Parts 6, 51, and 93 (November 30, 1993). A Federal action will fall under the jurisdiction of either the General Conformity Rule or the Transportation Conformity Rule. The Transportation Conformity Rule covers highway and transit projects. Projects that are not funded or approved by the Federal Highway Administration or the Federal Transit Administration will fall under the General Conformity Rule. Because the proposed improvements at Gary/Chicago International Airport comprise a Federal action within the jurisdiction of the FAA, the project is subject to the General Conformity Rule.

All rules for conformity of Federally sponsored or approved activities should be followed in meeting NAAQS and SIP requirements. The U.S. EPA has developed criteria and procedures for determining general conformity to State or Federal Implementation Plans in U.S. EPA *40 CFR Parts 6, 51 and 93* (November 30, 1993). For determining whether an action conforms to the SIP's purpose, the Proposed Action:

- Shall not cause or contribute to any new violation of the standard;
- Shall not increase the frequency or severity of any existing violation; and
- Shall not delay timely attainment of the standards.

To ensure future conformity, the General Conformity Rules set the air pollutant emission de minimis thresholds for criteria pollutants at all nonattainment and maintenance areas. If any Federally sponsored or approved action expects to generate air emissions exceeding these de minimis increments, a comprehensive conformity determination and/or mitigation measures is required.

Due to the area's ozone nonattainment status, the project's net annual emissions must not exceed established de minimis threshold increments. These threshold increments vary by pollutant and the area's nonattainment status. The generation of nitrogen oxides and volatile organic compounds, which combine in the presence of heat and sunlight to create ozone, are a source of concern. For a severe ozone nonattainment area, the thresholds are a net increase of 25 tons per year for volatile organic compounds (VOCs) and 25 tons per year for nitrogen oxides. This also means that emission increases resulting from the project should not exceed the emission forecast or budget included for the airport in the SIP. An airport project that exceeds the 25-ton per year threshold is still considered to be in compliance with the SIP if it is still within the projected increase in emissions budgeted for the airport. For all SO_2 nonattainment areas, the threshold level is 100 tons per year. Maintenance areas are subject to the same regulations as nonattainment areas. Therefore, the threshold level for increases in CO emissions in all nonattainment or maintenance areas is 100 tons per year. A moderate nonattainment area for PM10 is subject to a threshold level of 100 tons per year.

Conformity is defined in Section 176(c) of the CAA, amended in 1990, as conformity to the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards, as described above.

5.5.2.2 Analysis Procedures and Methodologies

Ambient emissions of criteria pollutants released within the project study area are associated mainly with mobile and stationary sources. For the purposes of this study, the evaluation of existing air quality conditions was based on the analysis of air pollutant emissions resulting from all activities relevant to airport operation and maintenance, nearby roadways (I-90, Industrial Highway, Cline Avenue, and Chicago Avenue), and a segment of freight line operated by the Elgin Joliet & Eastern Railway that lies south of the airport. No significant stationary sources of pollutant emissions are located at, or associated with, the airport. The ambient air quality can be affected by pollutants produced by aircraft, airport ground support equipment, surface transportation, and other stationary sources. These pollutant emissions and their effects on air quality within the project study area were identified. State-monitored existing air quality conditions in this region were also assessed. As described in the U.S. EPA developed *Criteria and Procedures for Determining Conformity of General Federal Actions to State or Federal Implementation Plans*[1], rules of air emission conformity for Federally sponsored or approved actions are applied to this project study area, currently designated by the U.S. EPA as nonattainment for ozone, PM10, and SO2 and as a maintenance area for CO. Under the General Conformity Rule only limited increases in pollutant emissions are allowed. Air emission inventories were calculated for the following criteria pollutants to develop a baseline:

- Carbon Monoxide (CO)
- Nitrogen Oxides (NOx) – Ozone Precursor
- Hydrocarbons (HC) – Ozone Precursor
- Sulfur Oxides (SOx)
- Particulates (PM10)

5.5.2.2.1 Aircraft and Airport Emissions Analysis

Air pollutant emissions generated by aircraft and airport operations were initially analyzed by following the U.S. EPA's *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, Chapter 5 Aircraft*[2]. In this guidance, the U.S. EPA and FAA jointly developed an aircraft exhaust emissions inventory database, FAEED (FAA Aircraft Engine Emission Database), as parts of AP-42 (U.S. EPA's Compilation of Air Pollutant Emission

[1] EPA 40 CFR Parts 6, 51 and 93
[2] EPA-420/R-92-009, December 1992

Factors) for specific aircraft types and engines under the taxiing/idling, takeoff, climb out, and approach operations. This FAEED database also constructed the basis for the most recent version of the *Emissions and Dispersion Modeling System (EDMS)* model. Therefore the EDMS, a microcomputer air pollution model jointly developed by the FAA and U.S. Air Force. Version 4.12, released on October 22, 2003, was utilized in the emission calculation and supplanted the need to use the FAEED calculation procedures.

Based on fleet forecasts of various types of aircraft provided in the 2001 Airport Master Plan Update, aircraft pollutant emissions were calculated in the EDMS model and FAEED database by using engine types, number of landing-take off (LTO) cycles, and time-in-mode (TIM) at each of the operating stages: taxi/idle, take-off, climb-out, and approach. Helicopter operations are also included in the model's database. In addition, the model can include emissions from ground support equipment (GSE), maintenance activities (e.g., deicing), stationary sources (if present), and surface transportation sources such as parking lots and roadways.

Inputs to EDMS included FAA-projections of aircraft operations for 2000, which were based on the 2001 Airport Master Plan Update and adjusted to account for nighttime operations and the observed mixture of different aircraft types. The resulting volume and mix of operations are consistent with the data used in the noise analysis. Information on taxi and idle times, GSE, and other variables were obtained from airport staff. Commercial aircraft operations may utilize aircraft tows, baggage tows, belt loaders, and deicers, all of which are diesel-powered. No water service, lavatory service, food service, etc., support units are used by these aircraft at Gary/Chicago International Airport. The use of auxiliary power units (APUs) is rare and they were not included in the analysis. No GSE was assigned to general aviation aircraft and helicopters. Traffic volumes on nearby roadways were obtained from the Indiana Department of Transportation. Use and dimensions for the airport's parking lot were obtained from airport staff. Based on this information, EDMS calculated the total emissions of air pollutants from aircraft, support facilities, and the surface transportation system within the Gary/Chicago International Airport study area for the pollutants of concern.

5.5.2.2.2 Methodology for Roadway Emission and Dispersion Analysis

The methodology for predicting roadway emissions from motor vehicles is characterized by examination of worst-case meteorological conditions, peak traffic conditions and roadway configurations, as described in the U.S. EPA-developed *Guideline for Modeling Carbon Monoxide from Roadway Intersections*[3], and *Guidelines for Air Quality*

[3] (EPA-454/R-92-005)

Maintenance Planning and Analysis, Volume 9 (Revised). Vehicular emissions were determined mathematically as a function of route speed, vehicle classification, average winter temperature, and other factors. These emission factors were calculated by utilizing the U.S. EPA's most recent computerized mobile source emissions model, MOBILE6.1, for estimating the composite vehicular emission factors. Traffic data used for the air quality analysis were derived from the traffic survey and other information obtained from the traffic analysis. The major elements of traffic data used in air quality analysis include traffic volumes and turning movements, traffic speeds, roadway configuration, and vehicle classifications, etc. Emission factors and traffic information were used in conjunction with the CAL3QHC dispersion model to determine worst-case CO concentrations along key roadway segments.

5.5.3 Existing Conditions – 2000

5.5.3.1 Baseline (2000) Air Emissions Released from Project Site

Air pollutants associated with Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby roadways were evaluated by utilizing the analysis model EDMS Version 4.12. The year 2000 was used as the baseline because flight levels following September 11, 2001, were not typical of normal airport operations. The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbon (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are presented in **Exhibit 5.5-2**.

EXHIBIT 5.5-2
GARY/CHICAGO INTERNATIONAL AIRPORT
Existing (2000) Annual Air Pollutant Emissions

Air Emission Source	CO Emission (tons/year)	VOC Emission (tons/year)	NO_2 Emission (tons/year)	SO_2 Emission (tons/year)	PM_{10} Emission (tons/year)
Aircraft	199.8	13.2	21.5	2.0	0.0
Ground Support Equipment	0.3	0.0	0.4	0.1	0.0
Roadway System	2,604.6	365.9	505.3	20.4	20.8
Railroad	0.9	0.4	9.6	0.0	0.2
Total	2,805.6	379.5	536.8	22.5	21.0

Source: LBG, EDMS and MOBILE emission inventory modeling

The emissions shown in Exhibit 5.5-2 reflect the relative low usage of GSE and the relatively short taxi and idle times at the airport. The 2000 emissions are base emissions that the future emissions would be projected from. The difference between the future build and no-build emissions will then be compared to the General Conformity Threshold to determine the conformity of the Proposed Actions.

According to U.S. EPA most recent available inventory data, (Sources of the Lake County Emission Summary: Environmental Defense, http://www.scoreboard.org, by organizing U.S. EPA emissions inventory) the annual air emissions of criteria pollutants released in Lake County are summarized for mobile sources, area sources, and point sources, respectively, as listed in **Exhibit 5.5-3**.

EXHIBIT 5.5-3
LAKE COUNTY EMISSION SUMMARY
Existing Annual Air Pollutant Emissions

Air Emission Source	CO Emission (tons/year)	VOC Emission (tons/year)	NO_2 Emission (tons/year)	SO_2 Emission (tons/year)	PM_{10} Emission (tons/year)
Mobile Sources	118,186	12,709	25,839	1,881	4,861
Area Sources	6,262	10,348	2,316	148	6,505
Point Sources	104,409	7,723	26,936	73,833	6,687
Total	228,857	30,780	55,091	75,862	18,054

Source: Environmental Defense and U.S. EPA emission inventory

For all pollutants examined, the aircraft and GSE at Gary/Chicago International Airport represent approximately 0.1% to 0.2% of the total mobile sources emissions in Lake County; and up to approximately 0.1% of the total all sources emissions in Lake County. Therefore, the Gary/Chicago International Airport is not a regional significant source.

5.5.3.2 Existing Regional Ambient Air Monitoring Data

Existing air quality in the State of Indiana is monitored by the Indiana Department of Environmental Management (IDEM) and tabulated in annual reports. These monitored data are also assembled in the U.S. EPA "Monitor Values Report" and published on the Web site of the Office of Air Quality Planning and Standards as *AIRData*. Representative regional monitored concentrations for the study area are shown in **Exhibit 5.5-4**.

EXHIBIT 5.5-4 GARY/CHICAGO INTERNATIONAL AIRPORT Representative Regional Monitored Ambient Air Quality Data			
	IDEM Monitored Data (2001)		
Pollutant	**Monitoring Station**	**Period**	**1st/2nd Highest**
Carbon Monoxide (CO)	901 East Chicago Avenue East Chicago (Lake County)	1-hour 8-hour	6.2 / 5.9 ppm 3.4 / 3.2 ppm
Sulfur Dioxide (SO_2)	201 Mississippi Street Gary (Lake County)	3-hour 24-hour Annual	218.4 μg/m^3 85.8 μg/m^3 10.4 μg/m^3
Particulates (PM_{10})	201 Mississippi Street Gary (Lake County)	24-hour Annual	207 / 130 μg/m^3 32.6 μg/m^3
Ozone (O_3)	201 Mississippi Street Gary (Lake County)	1-hour	0.110 / 0.106 ppm
Nitrogen Dioxide (NO_2)	201 Mississippi Street Gary (Lake County)	Annual Average	38 μg/m^3
Lead (Pb) Quarterly Average	Water Filtration Plant East Chicago (Lake County)	Quarterly Average	0.03 μg/m^3
ppm = parts per million μg/m^3 = micrograms per cubic meter *Source: U.S. EPA AIRData "Monitor Values Report, 2001".*			

These values are the most recent data monitored by IDEM in the Lake County and nearby Gary/Chicago International Airport areas. Monitored concentrations for criteria pollutants including carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead, were all well below (within) the standards for the most recent year available (2001). The short-term NAAQS is allowed to be exceeded once per year, and the 2001-monitored highest 24-hour PM10 concentration at Gary showed one detected level exceeding standard. The monitored ozone level in the study area was below (within) the standard by a small margin. Even though the monitored values for 2001 show compliance with the NAAQS, the area is still classified as nonattainment for several pollutants based on monitored values for previous years.

5.5.4 Future Conditions – 2007

The FAA has developed threshold criteria that determine whether a NAAQS assessment should be considered. For air carrier airports, the criterion for proceeding with an air quality assessment is based on annual enplanements, as well as the airport's general aviation activity. If the level of annual enplanements exceeds 1,300,000 and/or the level of general aviation and air taxi activity exceeds 180,000 operations per year, an assessment of airport emissions should be considered. If the project is not likely to exceed the threshold criteria, then no further analysis is necessary. The enplanements and operations projected for the 2007 No Action and Build alternatives do not exceed the threshold criteria.

Nevertheless, this document addresses air quality based upon FAA established *Air Quality Procedures For Civilian Airports and Air Force Bases (FAA-AEE-97-03)* in the following categories: 1) traffic air quality associated with carbon monoxide concentrations at key intersections; 2) total emissions of carbon monoxide, hydrocarbons, nitrogen oxides and PM10 from aircraft, parking lots, vehicle miles traveled, and stationary airport activities; 3) emissions associated with the relocation of a portion of the rail line; and 4) emissions due to on-site construction vehicles. The determination of impacts is based on a comparison of the 2007 No Action Alternative with the Build alternatives.

5.5.4.1 No-Action

5.5.4.1.1 Traffic Air Quality

A screening analysis was carried out to determine the project's status with respect to the NAAQS for CO. The screening analysis was based upon roadway Levels of Service (LOS) that describe the operating condition determined from the number of vehicles passing over a given section of roadway during a specified time period. It is a qualitative measure of several factors including speed, travel time, traffic interruptions, freedom to maneuver, driver comfort, convenience, safety, and vehicle operating costs. Six levels of service have been established as standards by which to gauge roadway performance, designated by the letters A through F. The level of service categories are defined as follows:

- Level of Service A: Free flow, individual users virtually unaffected by the presence of others;
- Level of Service B: Stable flow with a high degree of freedom to select operating conditions;
- Level of Service C: Flow remains stable, but with significant interactions with others;
- Level of Service D: High-density stable flow in which the freedom to maneuver is severely restricted;
- Level of Service E: This condition represents the capacity level of the road; and
- Level of Service F: Forced flow in which the traffic exceeds the amount that can be served.

The screening analysis followed *A Guideline for Modeling Carbon Monoxide From Roadway Intersections* (EPA 1992) These procedures involve examining traffic data, ranking relevant intersections by LOS, and identifying intersections that warrant further analysis. In accordance with the U.S. EPA and IDEM, intersections and free-flow segments of roadway with LOS of A, B, or C do not require further analysis for air quality impacts because they do not have sufficient delay to produce significant congestion and excessive idle emissions. An exception can be made for unsignalized intersections that operate at LOS D. If more detailed traffic analysis results show that all of the intersection approaches operate at no worse than LOS D, or the left turn movements for the uninterrupted road (i.e., without a stop sign) operate at LOS C or better, air quality dispersion modeling is not required. Otherwise, an air analysis for a roadway under LOS D, E, or F shall be required.

The roadways of concern in the vicinity of Gary/Chicago International Airport are US 12, SR 312, SR 912, and I-90. The traffic analysis presented in Section 3 of the 2001 Airport Master Plan indicated that these roadways are projected to operate at LOS C or better, with the exception of S.R. 912 from S.R. 312 to the Toll Road Entrance. This free-flow segment of roadway is projected to operate at LOS D in the future. Therefore, it was modeled using MOBILE 6.1 to obtain emission factors for a limited access urban highway, and CAL3QHC to determine concentrations at worst-case receptor locations. The segment of concern on S.R. 912 is four lanes wide (two in each direction) with a posted speed limit of 55 mph. Although the roadway is expected to be widened to three lanes in each direction by 2007, it was modeled with the existing configuration of two lanes in each direction as a worst-case analysis. During the peak AM period, this speed limit may drop to an average of 35 mph (Indiana Department of Transportation). As a worst case, the volumes for 2020 were used with the emission factors for 2007. Based on information from the traffic analysis described in the 2001 Airport Master Plan, the segment of concern is a free-flow segment and does not include a traffic light.

Land uses in the vicinity of the roadway segment include fields on the east side and a tank farm on the west side. However, any area to which the general public has access can be termed a sensitive receptor for the purposes of air quality analysis. Sensitive receptor points are typically set up at mid-sidewalk or just outside the "mixing zone"[4] of the roadway. Even though this segment of S.R. 912 is elevated by about 20 feet over the surrounding area, receptor points were set up at multiple points along the sides of the roadway.

The 2001 Airport Master Plan provided information that divides future traffic into background and airport-generated traffic. Based on that information and the CAL3QHC model, background traffic on S.R. 912 generates a maximum 1-hour concentration of 1.6 ppm of CO. This concentration occurs at multiple locations along the length of the segment. The 8-hour concentrations of CO are typically derived by multiplying the 1-hour concentrations by a persistence factor of 0.70. Applying this persistence factor to the one-hour concentration of 1.9 ppm results in an 8-hour concentration of 1.1 ppm.

[4] When modeling CO, the mixing zone is defined as the width of the lanes plus 10 feet on each side of the road.

The monitored values for CO at 901 East Chicago Avenue were used as background values to determine total CO. Adding the modeled 1-hour value of 1.6 ppm to the maximum monitored 1-hour value of 6.2 ppm yields a total CO concentration of 7.8 ppm. This is well within the NAAQS of 35 ppm. Adding the modeled 8-hour value of 1.1 ppm to the monitored 8-hour concentration of 3.4 ppm results in a total CO concentration of 4.5 ppm. This is in compliance with the 8-hour NAAQS of 9 ppm.

5.5.4.1.2 Railroad Emissions

The Elgin Joliet & Eastern Railway (EJ&E) operates a freight rail line that currently runs on an east-west alignment south of the airport, turning to the north just west of the airport property. The rail segment west of Gary/Chicago International Airport encroaches on the Runway Protection Zone (RPZ) and the Runway Safety Area (RSA). Approximately eight to 12 freight trains per day use the track, with the majority transporting coal. Each train consists of 50 to 149 cars and one to three locomotives. Speeds along this section of track typically range from 10 to 30 mph, depending on the steepness of the grade and the weight of the rail cars. The existing segment of track that would be affected by the proposed Build alternatives is approximately 7,800 feet long.

TranSystems Corporation, which prepared the Gary/Chicago International Airport Railroad Relocation Study, has studied multiple alternatives for relocating the railroad. Of these, the length of the Route 1D alternative is the closest to railway segment to be evaluated for the airport study. The firm provided information on the number of trains per day, number of locomotives and locomotive horsepower, and travel time over study segments of varying lengths. Emission factors based on grams per brake horsepower-hour (g/bhp-hr) were obtained from U.S. EPA's *Emission Factors for Locomotives* (December 1997). Total annual emissions were calculated by applying these emission factors to the information provided by TranSystems Corporation. Particulate matter includes a broad spectrum of particulate sizes, and PM10 is not identified in the U.S. EPA paper. As a worst-case analysis, 90% of particulates from diesel fuel combustion was assumed to be PM10.

Based on this information, the annual emissions for 2007 No Action Conditions would be:

HC 0.35 tpy

CO 0.94 tpy

NOx 9.57 tpy

PM10 0.24 tpy

Another railway alignment considered by Transystems, Route 1E, would be shorter than Route 1D. Therefore the resulting pollutant emissions would be lower than for Route 1D. Route 1D represents the worst-case alignment for the current airport study with regard to pollutant emissions. Since the projections of pollutant emissions are based on the brake-horsepower of the engines and the number of engines, no additional emissions are anticipated if the Proposed Action results in additional rail cars added to the trains.

5.5.4.1.3 Operational Emissions

The projected future Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby local roadways within airport vicinity were evaluated by utilizing the analysis model EDMS 4.12 and MOBILE6.1. The year 2007 emissions were evaluated because it is the milestone year in the SIP. The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbons (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are presented in **Exhibit 5.5-5**.

EXHIBIT 5.5-5
GARY/CHICAGO INTERNATIONAL AIRPORT
Future (2007) No-Action Annual Air Pollutant Emissions

Air Emission Source	CO Emission (tons/year)	VOC Emission (tons/year)	NO_2 Emission (tons/year)	SO_2 Emission (tons/year)	PM_{10} Emission (tons/year)
Aircraft	254.3	19.2	28.6	2.5	0.0
Ground Support Equipment	0.2	0.0	0.3	0.1	0.0
Adjacent Roadway System	1,892.4	200.3	402.3	16.3	16.6
Railroad	0.9	0.4	9.6	0.0	0.2
Total	2,147.8	219.9	440.8	18.9	16.8

Source: LBG, EDMS 4.12 and MOBILE6.1 emission inventory modeling.

As is evident from the table, aircraft emissions have increased due to the overall increase in aircraft operations from 2000 to 2007. However, the number of commercial operations has decreased slightly while other operations have increased, resulting in a decrease in emissions from GSE. Roadway emissions show a net decrease due to projected changes in the fleet mix and technological improvements to auto engines, as incorporated into the MOBILE6.1 model. These predicted future annual pollutant emissions under 2007 No-Action Conditions would be compared to the emissions under Project Development scenarios to determine the project effects.

5.5.4.2 Improvements to Existing Runway 12-30 to Conform to FAA Standards

5.5.4.2.1 Traffic Air Quality

CO concentrations under this alternative are the same as under the 2007 No Action alternative. The screening analysis determined CO emissions to be in compliance with the 1-hr and 8-hr NAAQS. No further increase in airport-generated traffic volume is anticipated under this alternative, since improvements to existing Runway 12-30 are for safety and meeting FAA Standards purposes. No increases in passenger load and cargo are expected.

5.5.4.2.2 Railroad Emissions

Relocation of the rail line to accommodate the runway length improvements of approximately 500 feet would add about 4,200 feet to the distance traveled by the freight trains. This additional length was incorporated into the formulas used for the No Action alternative. The resulting annual emissions were projected as:

HC	0.54 tpy
CO	1.45 tpy
NOx	14.73 tpy
PM10	0.36 tpy

In contrast to the No Action alternative, the incremental increases have been summarized in **Exhibit 5.5-6** below:

Exhibit 5.5-6 Railroad Emissions Summary, Improvements to Existing Runway 12-30 to Conform to FAA Standards				
Scenario	**CO Emission (tons/year)**	**VOC Emission (tons/year)**	**NO_2 Emission (tons/year)**	**PM_{10} Emission (tons/year)**
2007 No-Action	0.94	0.35	9.57	0.24
2007 Project Improvement to Meet FAA Standards	1.45	0.54	14.73	0.36
Incremental Increases	0.51	0.19	5.15	0.13

Source: U.S. EPA. December 1997. Technical Highlights: Emission Factors for Locomotives. U.S. EPA420-F-97-051.

All of these increments are within the permissible increases for the nonattainment status of the region.

5.5.4.2.3 Operational Emissions

The predicted future Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby local roadways within airport vicinity were evaluated by utilizing the analysis model EDMS 4.12 and MOBILE6.1. The year 2007 emissions were evaluated because it is the milestone year in the SIP; however, these emissions would likely start in 2008 since the operational emission is a sequential result of construction (with the railroad relocation completed in 2007.) The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbon (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are presented in **Exhibit 5.5-7**.

EXHIBIT 5.5-7 GARY/CHICAGO INTERNATIONAL AIRPORT Future (2007) Annual Air Pollutant Emissions					
Air Emission Source	**CO Emission (tons/year)**	**VOC Emission (tons/year)**	**NO_2 Emission (tons/year)**	**SO_2 Emission (tons/year)**	**PM_{10} Emission (tons/year)**
Aircraft	254.3	19.2	28.6	2.5	0.0
Ground Support Equipment	0.2	0.0	0.3	0.1	0.0
Adjacent Roadway System	1,892.4	200.3	402.3	16.3	16.6
Railroad	1.5	0.5	14.7	0.0	0.4
Total	2,148.4	220.0	445.9	18.9	17.0

Source: LBG, EDMS 4.12 and MOBILE6.1 emission inventory modeling

By comparing the predicted emissions under both future improvement (Exhibit 5.5-7) and no-action (Exhibit 5.5-5) scenarios, the impacts of the proposed project are insignificant. The estimated emissions increases for CO, VOC, NO_2, SO_2, and PM_{10} will only be 0.6, 0.1, 5.1, 0.0, and 0.2 tons/year, respectively; and are all far below (within) the General Conformity Thresholds (25 ~ 100 tons/year) as described in Section 5.5.2.1.4.

5.5.4.3 Improvements to Provide Additional Runway Length on Runway 12-30

5.5.4.3.1 Traffic Air Quality

CO concentrations under this alternative are the same as under the 2007 No Action alternative. The screening analysis determined CO emissions to be in compliance with the 1-hr and 8-hr NAAQS. No further increase in airport-generated traffic volume is anticipated under this alternative since no increases in passenger load and cargo are expected.

5.5.4.3.2 Railroad Emissions

The railroad emissions for this alternative would be the same as for the alternative to conform to FAA standards. The incremental increases in criteria pollutants are within the permissible levels for the nonattainment status of the region.

5.5.4.3.3 Operational Emissions

The predicted future Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby local roadways within airport vicinity would be the same as for the alternative to conform to FAA standards. The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbon (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are the same as those presented in Exhibit 5.5-6. Although the proposed additional length to Runway 12-30 may permit aircraft to carry more fuel and baggage, thereby allowing the aircraft to utilize a heavier takeoff weight, no means of projecting the number of affected flights is available. Therefore, no information on flight stage length was including in the modeling. However, the overall contribution to regional emissions from a small number of flights carrying more fuel would not significantly increase the projected emissions.

As stated above, by comparing the predicted emissions under both future improvement (Exhibit 5.5-7) and no-action (Exhibit 5.5-5) scenarios, the impacts of the proposed project are insignificant. The estimated emissions increases for CO, VOC, NO_2, SO_2, and PM_{10} will only be 0.6, 0.1, 5.1, 0.0, and 0.2 tons/year, respectively; and are all far below (within) the General Conformity Thresholds (25 ~ 100 tons/year) as described in Section 5.5.2.1.4.

The year 2007 emissions were evaluated because it is the milestone year in the SIP; however, these emissions would likely start in 2008 since the operational emission is a sequential result of construction (with the railroad relocation and runway extension completed in 2007.)

5.5.4.3.1 Railroad Relocation

Under this alternative for providing additional runway length on Runway 12-30, the predicted future 2007 Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby local roadways within airport vicinity would be the same as for the alternative to conform to FAA standards. The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbon (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are the same as those presented in Exhibit 5.5-7.

5.5.4.3.2 Existing Terminal Expansion

Under this alternative, the predicted future 2007 Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby local roadways within airport vicinity would be the same as for the alternative to conform to FAA standards. The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbon (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are the same as those presented in Exhibit 5.5-7 above. CO impact concentrations under this alternative are the same as under the 2007 No Action alternative. No increases in airport-generated traffic volume are anticipated under this alternative.

5.5.4.3.3 Acquisition and/or Reservation of Sites for Future Passenger Terminal and Air Cargo Facilities

Under this alternative, the predicted future 2007 Gary/Chicago International Airport aircraft operations, airport ground support equipment and facilities, and nearby local roadways within airport vicinity would be the same as for the alternative to conform to FAA standards. The predicted total air pollutant emissions of carbon monoxide (CO), hydrocarbon (VOC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates (PM10) are the same as those presented in Exhibit 5.5-7 above. CO impact concentrations under this alternative are the same as under the 2007 No Action alternative. No increases in airport-generated traffic volume are anticipated under this alternative since no increases or negligible increases in passenger load and cargo are expected.

5. 5.4.4 Construction Impact on Ambient Air Quality

Construction air quality impacts are related to defined construction periods, effects of construction management, equipment utilization, and contractor activities. Pollutants of concern for this project include PM10 (particulate matter)/fugitive dust, PM2.5, VOC, NOx, and CO emissions, depending upon the size of the project and length of the construction period. A quantitative construction related impact evaluation for the proposed Gary/Chicago International Airport construction activities was conducted for all constructions modules during scheduled construction year 2005, 2006, and 2007 respectively, to evaluate various pollutant emissions and air quality conformity. The emissions resulting from project construction emissions were then determined as complying with conformity de minimis levels. This conformity analysis and emissions evaluation procedures followed the criteria and procedures regulated in 40 CFR Parts 6, 51, and 93, Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule (November 30, 1993). The State of Indiana has also established Air Rule 326 IAC 16-3-1, Rule 3 General Conformity to require Federal actions to be subject to the provisions in this rule. Indiana incorporates the guidelines and procedures in U.S. EPA 40 CFR 51, Subpart W to determine the conformity.

Technical methodologies in this analysis were based on the U.S. EPA's guidelines and formats pertaining to evaluation of pollutants resulting from construction activities and vehicles, including Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised); AP-42 Compilation of Air Pollutant Emission Factors, remediation estimates, and U.S. EPA NONROAD model. The construction schedules, module parameters and phases, construction activities, layout, and work zones, as well as types, sizes, amounts and operating hours, average horsepower (hp) of the construction equipment to be utilized were evaluated based on airport construction engineering data. The construction emissions were calculated based on a “worst-case” assumption, with both the EJ&E Railway Interim Route 1E and Route 1-D included in the construction emissions modeling. Emissions would be lower if only the Interim Route 1E is completed before 2007 or if funds are available to construct Route 1D. The total air emissions resulting from all construction modules during all years – 2005, 2006, and 2007 were then summed up to determine their impacts and the project conformity during construction period. **Exhibit 5.5-8** summarizes total air emissions resulting from the proposed 2005, 2006, and 2007 construction activities.

Exhibit 5.5-8
Annual Air Emission Burden Of Construction Equipment
(tons/year)

Criteria Pollutant		**Year 2005 Construction**		**Year 2006 Construction**		**Year 2007 Construction**	
	Threshold (tons/year)	**Total Emission (tons/year)**		**Total Emission* (tons/year)**		**Total Emission* (tons/year)**	
VOC	25	1.71		1.17		1.22	
NOx	25	11.63		18.14		19.97	
CO	100	4.24		6.65		7.32	
PM-10	100	0.71		1.17		1.29	
PM-2.5	-	0.67		1.09		1.22	
SOx	100	1.73		2.73		3.41	

*: For worst-case construction including both Route 1D & 1E in Module 5A.

Source: The Louis Berger Group, Inc., 2004

For all cases examined, the annual emissions resulting from construction equipment and vehicles during year 2005, 2006, and 2007 are below (within) the conformity emission thresholds. Therefore, the Gary/Chicago International Airport construction activities will conform to the General Conformity Rules and CAAA requirements. It should be noted that construction and operational increases have not been combined, since operational emission is a sequential result of construction completion. The operational emission increases are most likely to start in 2008 after the railroad relocation and runway extension projects are completed in 2007. During construction, the on-site construction management and policy can further reduce these emissions as described in Section 5.20, Construction Impacts.

5.5.5 Summary of Findings

The air quality emission and impact evaluation results are consistent with the impact findings through airport operation, proposed construction, and traffic evaluation, and purpose of the proposed project. To ensure the compliance with Ambient Air Quality Standards and SIP requirements, the proposed project:

- will not cause or contribute to any new violation of the standard;
- will not increase the frequency or severity of any existing violation; and
- will not delay timely attainment of the standards.

Therefore, the project will have an insignificant impact on air quality and will comply with the rules and the requirements of the Clean Air Act.

5.5.6 Mitigation

Mitigation measures for air quality impact purposes during operation and construction periods are not required since this project will meet the conformity thresholds.

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